

Knotweed: What is It and How Can We Get Rid of It?

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Agenda

- What is knotweed?
- Background and legal status
- Projects and partnerships
- Biology and spread
- Control methods
- Stem-injection training

Knotweed

(*Polygonum.spp*)

- Imported from Asia
- Bamboo-like hollow stems
- Tall clone-forming perennial
- Spikes of white flowers
- Extensive roots!

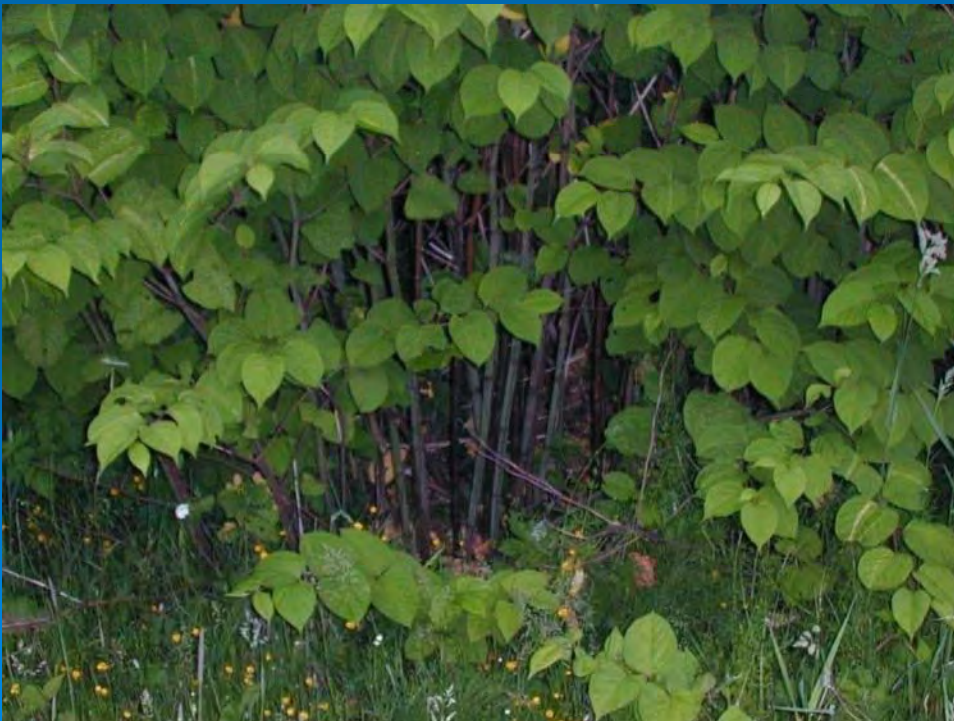




Knotweed

(Polygonum. spp)

- Environmental damage
- Property damage



Knotweed – Bad for our Rivers

- Forces out native and desirable plants
 - Thousands of stems per acre
 - Develops a monoculture
 - Dead canes decompose slowly
 - Rapidly invades riparian forests
- Can increase erosion/ turbidity
 - Rhizomes brittle; roots coarse
 - No cover during winter storms
- Reduces habitat for fish and other wildlife
 - Reduces plant diversity
 - Food sources/ insects
 - Shade and microclimate
 - Prevents tree establishment
- One of the most difficult plants to eradicate growing in some of the most sensitive habitats
 - We have miles and miles of valuable riparian and wetland habitat vulnerable to knotweed invasion





Knotweed crowds out beneficial trees and shrubs and harms fish habitat



The Nature Conservancy

Despite knotweed's large rhizome mass, it provides poor erosion control



Knotweed can grow through almost anything including asphalt

Knotweed Status in King County

- Was widely planted in our region since early 1900's
- Currently widespread, urban to rural and coastal to foothills
 - Heaviest concentrations found along riparian corridors and road rights-of-way
 - Also in many parks, backyards, wetlands, etc.
- Class B Non-Regulated Noxious Weed
 - Property owners and public agencies are NOT required to control knotweed in King County
 - Due to how much there is and how difficult it is to control
 - High priority for grant-funded projects and for providing technical assistance to landowners
 - Due to how much impact it has and the public benefit to reducing it as much as possible

Knotweed Projects and Partnerships

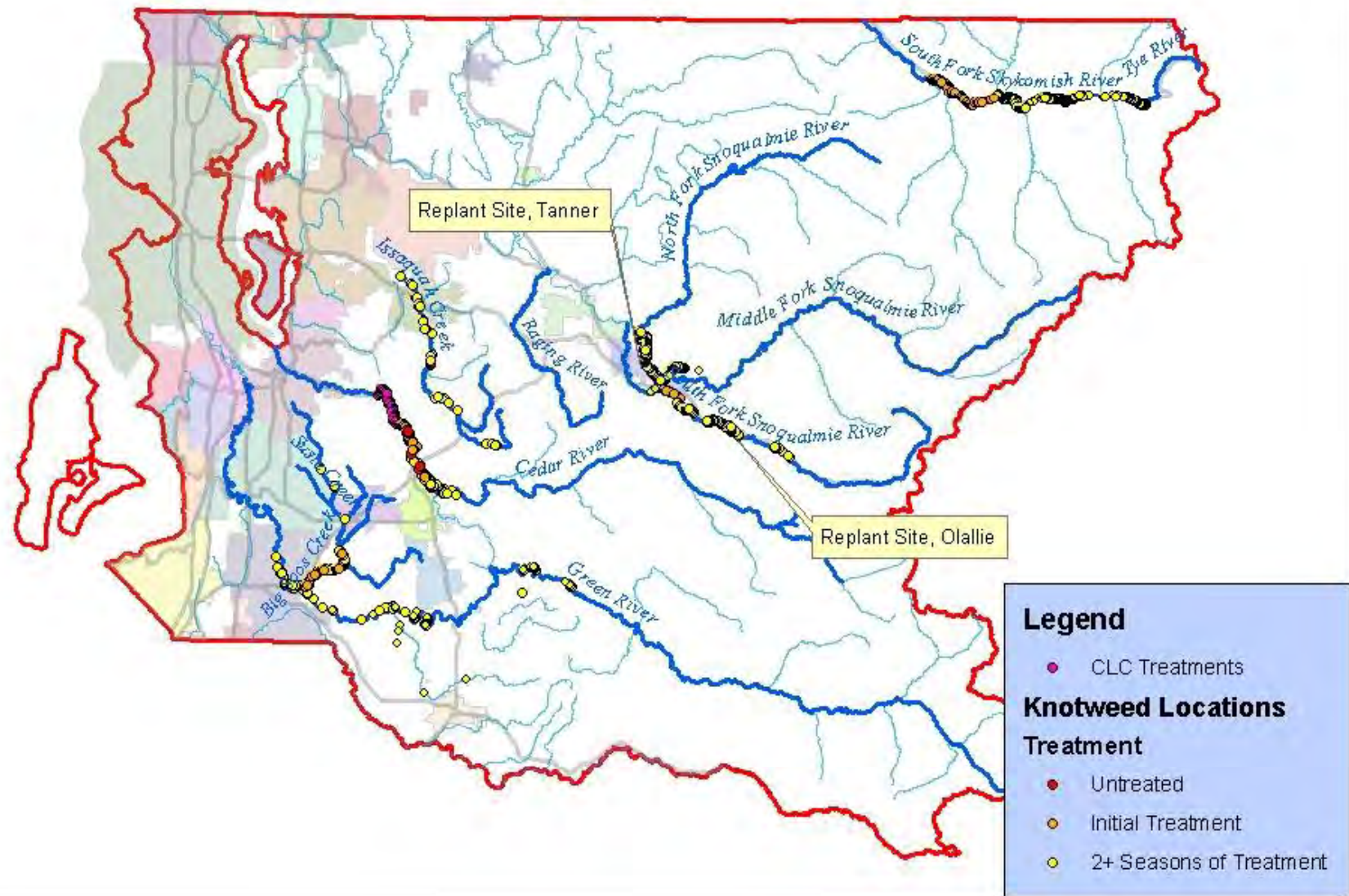


Cooperative Knotweed Projects

- Share similar strategies
 - Cooperative and inclusive of all stakeholders
 - Need strong community and stakeholder support
 - Comprehensive and top-down
 - Protect and restore fish and wildlife habitat
 - Public benefit, so able to use public funds through grants, etc.
- Present different challenges
 - Public vs. private ownership
 - Restrictions on methods – no spray areas, permits, owner choices
 - Funding limitations, grant priorities/requirements
- Noxious Weed Program projects are only part of the knotweed control efforts in the county
 - Other agencies and non-profits – SPU, CLC, Greenway Trust
 - Cities like Duvall, Lake Forest Park, Kent, Maple Valley, etc
 - Private landowners

King County Knotweed Control Projects

Status as of Oct. 2010



A Closer Look at Knotweed





Leaves are alternate; stems reddish



Flower clusters are upright along stems



Hollow, stout, bamboo-like stems often reddish or red-speckled



Typical stand of Bohemian knotweed, the most common knotweed here

Giant Knotweed (*Polygonum sachalinense*)



Large heart-shaped leaves



Giant knotweed in early spring with last year's dead stems

Himalayan Knotweed

(*Polygonum polystachyum*)



Photos courtesy of Glenn Miller, Oregon
Department of Agriculture

Knotweed Stems in Winter



©2003, Gary Fewless



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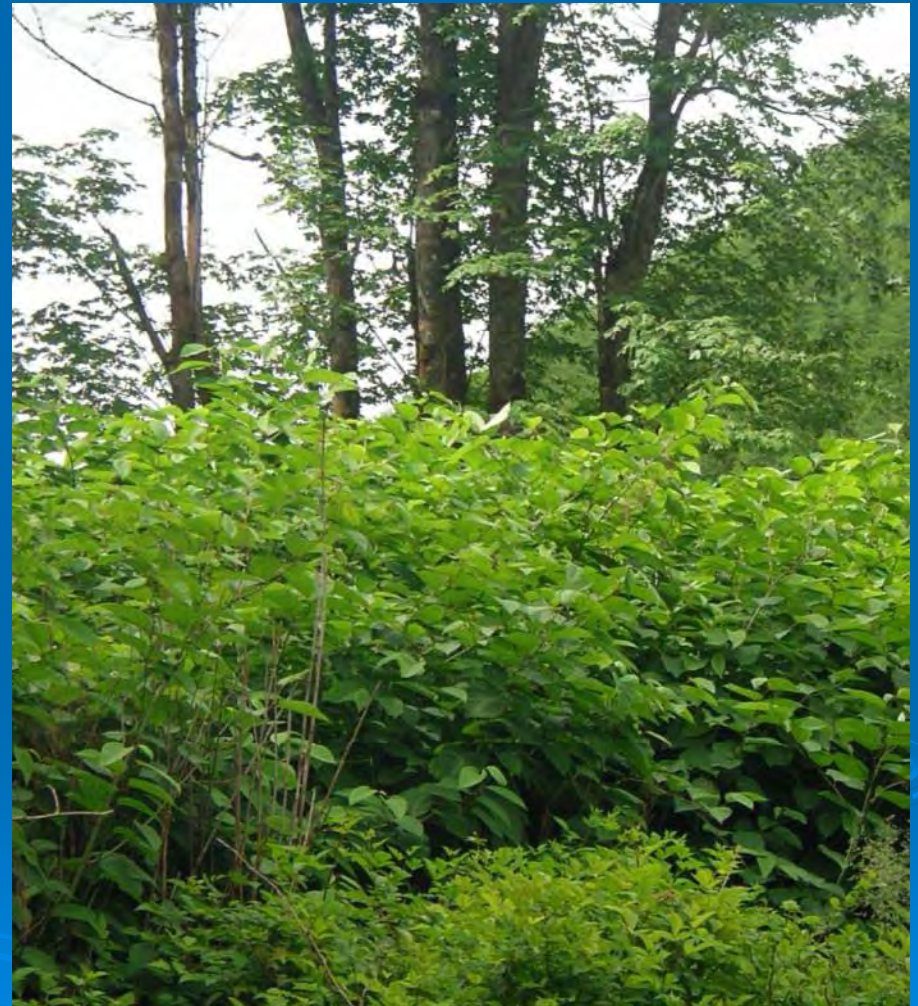
Plants die back to the ground after hard frosts but hard, dry stems persist through the winter

Knotweed Growth and Spread



How Knotweed Takes Over

- Colonizes flood-scoured shores and islands and other exposed areas
- Tough plant that out-grows others
- Emerges early in the season and quickly out-grows and shades out other plants
 - inhibits even trees like alder and willow
 - understory of knotweed is usually bare of other plants
- Few local natural controls on its growth





How Knotweed Grows and Spreads

- Rapid growth in April, full height by mid-June (10-15 ft)
- Rhizomes spread 20 feet or more, up to 7 feet deep
- Root and stem fragments as little as ½ inch can form new plants
- Fragments spread by floods, mowers, beavers, earth moving equipment, and in contaminated fill material





How knotweed grows and spreads (<http://www.knotweed.co.uk>)



Knotweed



Root mass



12 days later





Knotweed Broken Loose on South Fork Snoqualmie River





Knotweed stems also move downstream – cut by people, animals, floods



Cut knotweed stems in the river



Beaver using knotweed on dam

Mowing spreads knotweed stem fragments along roadsides



Knotweed Control



Knotweed Control Issues

Many Things to Consider:

- Location (especially proximity to water)
- Land-use
- Size and density of the infestation
- May require multiple years of repeated effort to get rid of completely
- Use Integrated Pest Management framework

Aquatic pesticide treatments require:

- Aquatic endorsement on pesticide license
- National Pollutant Discharge Elimination System (NPDES) permit from Washington Department of Ecology

When To Use Manual Methods

- Easy site access
- Patches are small (50 stems or less)
- You can commit to following an intensive control regimen
- You don't intend to use stem injection method since repeated cutting tends to produce numerous small stems, too small to inject
- As follow up to several seasons of chemical control when re-growth is small and stunted

Digging

- Dig up as much root as possible in the summer over at least three consecutive years
- Can work for small, isolated patches
- Be sure to carefully dispose of the roots
- Do not put roots in a compost pile
- Be sure to search at least 20 feet away from the original patch center



Digging knotweed up is possible but roots may go down 7 feet deep and extend out 20 feet and re-sprouting is likely



Repeated Cutting

- Cut stems close to the ground TWICE A MONTH OR MORE between April and August
 - Once a month September to first frost
 - Try to keep plants from growing taller than 6 inches
 - Using a mower/weed-eater is an option if set close to the ground
- Rake and pile up the cut stems where they will dry out, because stem fragments can root at the nodes
 - Do not allow cut, mowed or pulled knotweed to enter waterways
- Repeat treatment every year for about 5 years



This is not a good site for control by cutting!

Covering

- Cover with heavy duty geotextile fabric or black plastic to block sun
 - Works better with isolated and smaller patches on flat, open terrain
- First, cut stems down to ground surface and rake away stems or stomp on them to flatten as much as possible
- Next, cover the area extending at least 10 feet beyond the outermost stems
- Weigh the covering material down with heavy rocks or concrete blocks
 - Covering should be loose enough to allow some growth without knotweed punching through fabric
- Check once or twice a month, remove sprouts on edges, fix any holes, stomp down re-growth
- Plan to leave the covering material in place for three to five growing seasons

Seattle Public Utilities



Loose Fabric – Allows Growth Under It

Geotextile Fabric



Too Tight – Plants Break Through



Not a good site for the covering method – too steep and floods yearly

Chemical Control



General Issues

- Use an herbicide product labeled for the site
 - e.g. aquatic, non-crop/right-of-way, home and garden, pasture, forestry
- Follow label rates – more is not necessarily better!
- Always read and follow label instructions
- Use correct PPE
 - At minimum: safety glasses, chemical proof gloves, long sleeves and pants, boots
- May need an NPDES permit from Dept of Ecology if there is any chance of herbicide getting into water

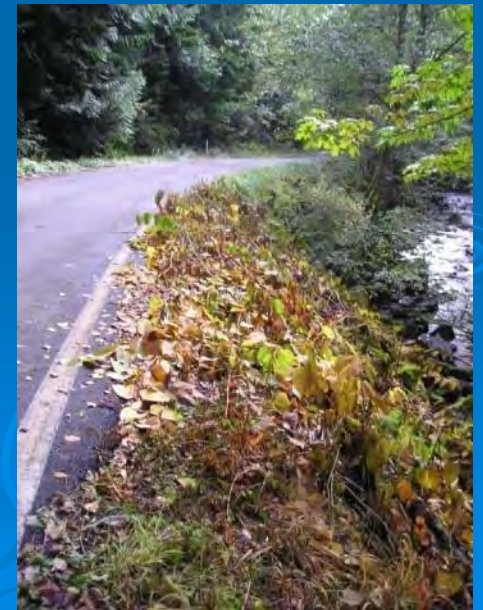
Herbicide Types

- Use systemic herbicide – goes from leaves to roots
- **Glyphosate:** 4 to 6 % solution
 - **Roundup** – away from water; **Aquamaster** or **AquaNeat** – when plants are next to or in water
 - Fairly effective but will get some re-growth
- **Imazapyr:** 1% alone or 0.5% with 3% glyphosate
 - **Arsenal** - non-aquatic sites; **Habitat** – aquatic
 - Slow-acting and expensive but highly effective; need to add surfactant; can be combined with glyphosate
- **Triclopyr:** ¾ to 5% solution (lower rates may get better long-term control)
 - **Garlon 3A, Brush Be Gon**, etc. – non-aquatic sites
 - **Renovate** – aquatic sites
 - For grassy sites, selective – will not harm grass
 - Least effective long term control; usually just one year of control
- **Aminopyralid:** 7 oz rate
 - **Milestone** – non-aquatic sites
 - Selective – will not harm grass, rushes, cattails, etc
 - Can be applied earlier in season (in May)
 - Very expensive, but low rate means only small amount used



Foliar Spraying

- After buds form, before plants die back
 - Usually mid-June to September
- Works well to cut or bend stems, then spray in the late summer or early fall when stems are 3 to 6 feet tall
- Useful for re-growth the year following injection or around covered areas
- May take several weeks to show impact
- Expect 3 or more years of treatment
 - Search at least 20 feet away when re-treating area
 - Continue to monitor sites for at least three years after knotweed appears to be gone



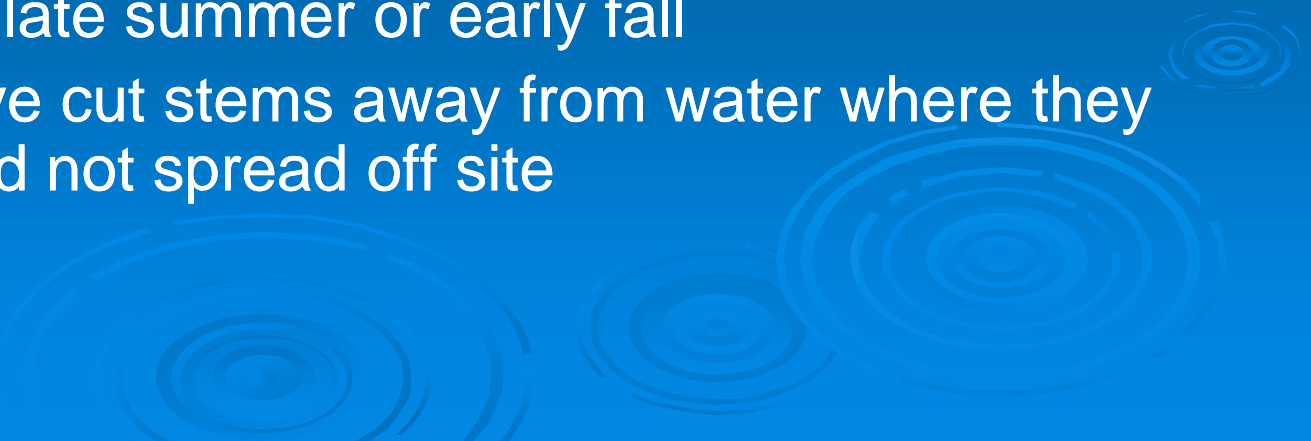




- Left: Flaming Geyser State Park prior to treatment 2004
- Below: Re-growth at same location after treatment, early 2005



Cut Stem/Pour Application

- Similar to stem injection, may not be as effective
 - May be good for small patches and greatly reduces drift
 - Cut stems between lowest 2 nodes
 - 3 ml undiluted (concentrated) glyphosate into stem cavity
 - Can use a large needle with measured reservoir to be precise
 - Be very careful not to splash out onto the ground
 - Follow label directions on amount applied per acre
 - for the 2 gallons per acre label can only inject 2500 stems/acre
 - Timing best in late summer or early fall
 - Need to remove cut stems away from water where they can dry out and not spread off site
- 

Wick Wipe Method

- Uses an applicator with a sponge on the end of a reservoir for the herbicide
- Use glyphosate at 33 to 50 % concentration
- Greatly reduces drift
- Hard to get chemical on leaf surface and seems to increase personal contact with herbicide





Applying herbicide to knotweed leaves with a wick wiper to avoid drift onto desirable species

Stem-Injection



Stem Injection

- Use stem injection gun or similar tool
 - Also marker paint or marker and a cork for the needle
- Follow directions carefully especially calibration and cleaning
 - Inject 3 ml into stem between first and second nodes or between second and third node if too woody lower down
- Timing best from mid-June to end of September
- Check to make sure the product has a label specifically for injection



Pros of Stem Injection

- Highly effective: 90% or more controlled in first year
- Greatly reduces drift and highly selective
- No cut stems to deal with

Cons of Stem Injection

- Very time and labor intensive compared with foliar spraying
 - Need to inject every cane in the stand
- Use much more herbicide to treat the same area
- Glyphosate label typically 2 gallons per acre so can only inject 2500 stems per acre
- Can only inject stems over ½ inch so there will always be small stems that can't be injected in a population, especially in the second year of treatment





Dead knotweed canes following treatment with stem injection gun



2004 After Stem Injection



Spring 2005



Spring 2006

Knotweed Control Summary

Manual Control: Fragments in soil can produce new plants; dig carefully & discard roots in garbage

- Small patches, easy access, follow up to chemical control

Mechanical Control: Fragments can form new plants, new shoots will form where the canes were mowed

- Mow close to the ground twice a month for 3-5 years to weaken rhizome

Covering: 5 years, plant into it in 3 years

- Cardboard and lightweight plastics are not effective
- Heavy-duty geotextile fabric or black plastic works well; weigh down with rocks and stomp down re-growth 1-2 times per month and control sprouts along edges

Chemical Control:

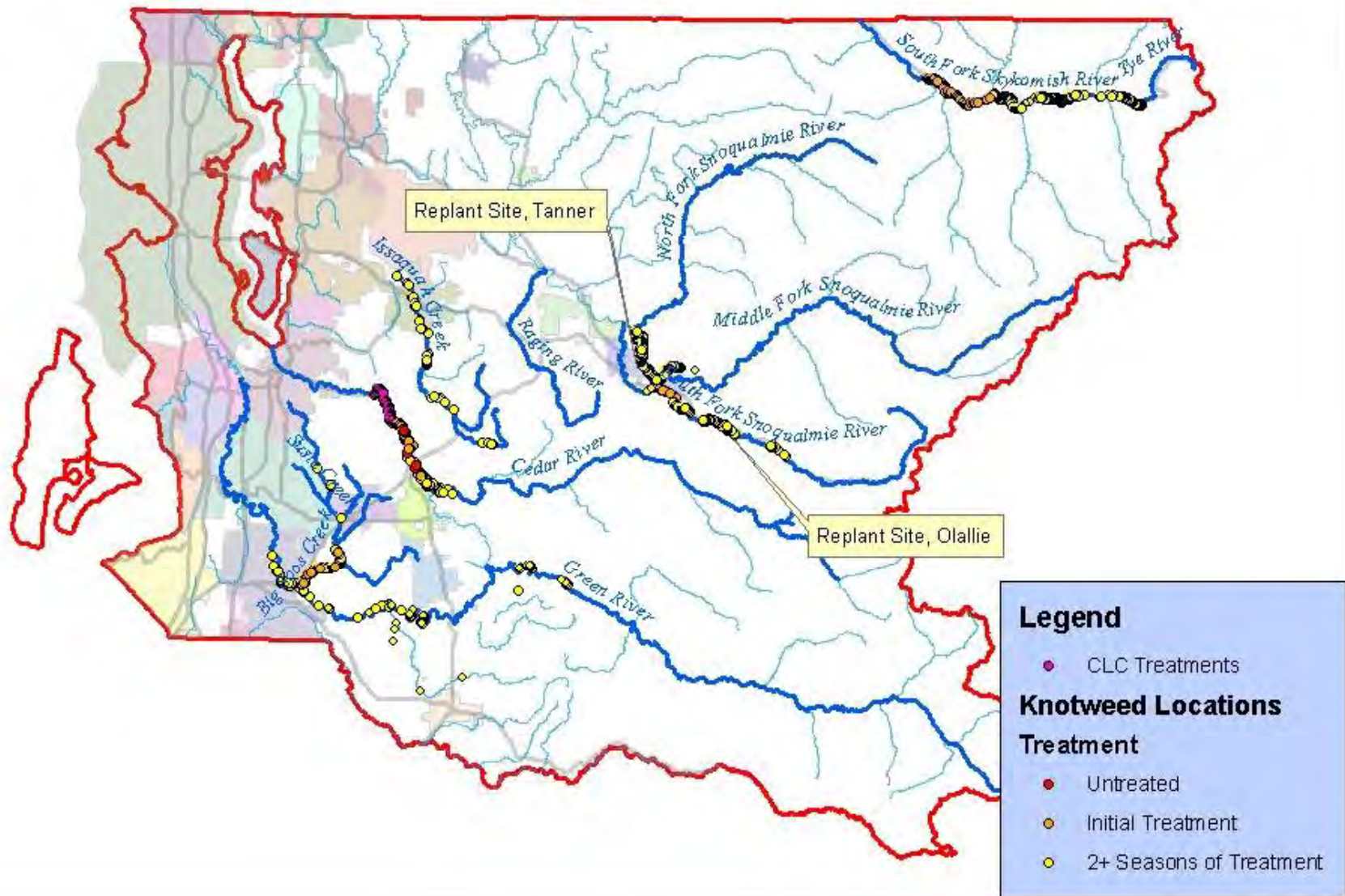
- Foliar: (4-5% glyphosate or 1% imazapyr) plus (1% surfactant)
- Stem injection: applies herbicide directly to canes reducing drift, collateral damage, and contact with water; concentrated glyphosate



Protect our rivers – control knotweed!

Useful Websites

- King County Noxious Weed Control Program
 - www.kingcounty.gov/weeds
- Washington State Department of Agriculture Knotweed Program
 - <http://agr.wa.gov/PlantsInsects/Weeds/Knotweed/Knotweed.htm>
- Stem-injection tool information and ordering
 - <http://www.jkinjectiontools.com>
- Aquamaster label/supplemental label
 - <http://www.monsanto.com/ito/products/aquamaster.html>



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